

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE**

HEARING CHARTER

*The 2003 Presidential Awardees for Excellence in Mathematics and Science Teaching: A
Lesson Plan for Success*

**Thursday, March 18, 2004
10:00 a.m. - Noon
2318 Rayburn House Office Building**

1. Purpose

On Thursday, March 18, 2004, the House Committee on Science will hear from teachers on how the federal government can help improve K-12 math and science education. Four secondary school math and science teachers will testify before the Committee. Each is a recipient of the 2003 Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST), the Nation's highest commendation for K-12 math and science educators.

2. Witnesses

Mr. Jonathan Roland is a teacher at Perry Hall High School in the Baltimore County Public Schools in Baltimore, Maryland, where he teaches conceptual, standard, honors, gifted and talented and Advanced Placement physics. Mr. Roland is also an adjunct professor at Johns Hopkins University, where he designed and taught "Understanding and Teaching Physical Sciences in Middle School" and "Understanding and Teaching Physics in Elementary School." He received his Bachelor of Science degree in Chemical Engineering from the University of Delaware and his Master's degree in Teaching from Towson University.

Ms. Gail Bromiley-McGee is a science teacher at Carnegie VanGuard High School in Houston, Texas, and before that she taught biology at DeBakey High School for Health Professions. Ms. Bromiley-McGee holds a Bachelor of Science degree in Biology from Trinity University and she has completed 124 post-degree hours in biology, zoology and botany at the University of Texas at Austin.

Mr. Jason Cushner most recently was a teacher at Eagle Rock School and Professional Development Center in Estes Park, Colorado, a full-year, residential program for students who have dropped out or been expelled from high school. There he taught all levels of mathematics, from basic to calculus. Mr. Cushner holds a Bachelor of Science degree in Applied Mathematics from the University of California at Irvine, and a Master's degree in Secondary Math Education from Colorado College.

Ms. Wendy Ehnert is a teacher at Austin E. Lathrop High School in Fairbanks, Alaska, where she teaches biology, chemistry and physical science. Ms. Ehnert is a National

Board Certified Teacher in Adolescence and Young Adulthood Science and she served as a Fulbright Exchange Teacher in Olomouc, a city in the Czech Republic. Ms. Ehner holds a Bachelor's degree in Life Science from the University of Minnesota College of Education and a Master's degree in Teaching Biology from the University of Alaska, Fairbanks.

Background

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On April 26, 1983, a blue-ribbon commission appointed by the Reagan Administration released "A Nation at Risk," a report containing strong language and disturbing findings on the state of education in the U.S. In one of its more memorable lines, the report claimed, "If any unfriendly foreign power had attempted to impose on America the mediocre education performance that exists today, we might well have viewed it as an act of war." Included among the "indicators of risk" were international comparisons of student achievement, which revealed that U.S. students were never first or second on any of 19 different academic tests, and they scored in last place in seven of them. National assessments also showed a steady decline in science achievement scores of U.S. 17 year-olds.

Also in 1983, President Reagan signed into a law a program establishing the Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) to identify outstanding science and mathematics teachers in kindergarten through 12th grade.

The 2000 National Assessment of Educational Progress (NAEP) shows that large numbers of U.S. students still demonstrate only a rudimentary understanding of mathematics: 31 percent of 4th graders, 34 percent of 8th graders and 35 percent of 12th graders scored below "basic," meaning that the student failed to demonstrate even partial mastery of the knowledge and skills that are fundamental for proficient work at each grade level. And, the achievement gap in NAEP math scores between white and black students and between white and Hispanic students has remained relatively unchanged since 1990, with 68 percent of African American 8th graders scoring below basic compared to 23 percent of white students.

On international assessments, U.S. performance relative to other nations actually declines with increased schooling. According to the most recent (1999) Third International Mathematics and Science Study (TIMSS), an assessment that evaluates the math and science performance of 4th, 8th and 12th grade students from 42 different countries, most U.S. students score above average in elementary school, but those in 12th grade—including our most advanced students—rank among the lowest of all participating countries, outperformed by nearly every industrialized nation and ahead of only Cyprus and South Africa.

Issues in K-12 Education

Over the years, a common theme in education reform has emerged: a qualified teacher is critical to the success of any K-12 science and math education reform effort. Yet, in

response to impending teacher shortages, particularly in the areas of special education, math and science, many states have allowed individuals without appropriate background to teach. In fact, the 1996 National Commission on Teaching and America's Future found that "more than 50,000 people who lack the training required for their jobs have entered teaching annually on emergency or substandard license." More recently, a survey by the U.S. Department of Education found that 49 percent of seventh grade mathematics teachers did not have the equivalent of a minor in mathematics, and that 32 percent of middle school science teachers did not have the equivalent of a minor in any of the sciences.

A related problem is the exodus of new teachers from the profession, with more than 30 percent leaving within five years. High teacher turnover creates a continual demand for new teachers, and those teachers require teacher professional education and development. Partly as a result, many schools are moving toward the regulation of teaching practice, such as the use of more scripted curriculum materials—something that may limit some able teachers from exercising their professional knowledge and discretion, making teaching less inviting to those most qualified.

Deleted: the profession

To achieve its twin goals of improving education and narrowing the achievement gap, "No Child Left Behind" requires a "highly qualified" teacher in every classroom, it raises the qualifications of paraprofessionals (also known as teacher aides) and it requires public reporting of staff qualifications. It also provides state grants to recruit and train teachers. In addition, loan forgiveness programs at the Department of Education and the Noyce Scholarship Program at the National Science Foundation (NSF), which seeks to encourage top math and science students to enter the teaching profession, are just some of the initiatives that have been designed to address issues of teacher recruitment and retention.

At its center, however, "No Child Left Behind" seeks to hold schools accountable for the progress of their students by requiring that all students in grades 3 – 8 be tested every year in reading and math (and, beginning in 2007, science), and that all students make "annual yearly progress" toward proficiency in these subjects. Failure to do so results in a school being identified as "needing improvement," which triggers various interventions, such as additional funding, choices for parents and corrective actions. The reliance on testing has led some educators to complain about the prevalence of drilling, test prepping, "teaching to the test" and "dumbing down the curriculum."

NSF K-12 Education Programs

President Bush's education reform initiative also called for the creation of a new Math and Science Partnership Program at NSF to unite the activities of higher education, school systems and business in support of improved math and science proficiency for K-12 students and teachers. Ultimately, Congress created complementary programs: one at NSF and one at the Department of Education. The NSF program awards grants on a peer-reviewed, competitive basis to partnerships between institutions of higher education and one or more school districts to improve math and science education. Funds are used

to develop innovative reform programs that, if proven successful, would be the key to large-scale reform at the state level.

The Department of Education program, with its program allocation based on a poverty/population formula, funds all 50 states, which in turn compete awards to math and science partnerships at the local level. Although similarly titled, the programs were created to be complementary, not duplicative. NSF funds innovative programs in science and math to develop and test new models of education reform, thereby remedying a lack of knowledge about math and science research. The Department of Education builds on its traditional relationships with school districts and schools and funds science-based teaching materials, curricula and training programs, with a recent focus on improving student achievement and teacher performance in math. The Fiscal Year 2004 omnibus appropriation provided the Education and the NSF partnership programs with approximately \$150 million and \$140 million respectively. The Fiscal Year 2005 budget zeroed out the NSF program and transferred \$120 million to the Department of Education.

The Science Committee adopted a clear position opposing this move in its Views and Estimates. In part, the Committee stated:

The Committee is especially troubled by the proposal to eliminate the NSF's Math and Science Partnership Program. This program was specifically authorized as part of the *National Science Foundation Authorization Act of 2002*. The Committee strongly believes that NSF is the only federal agency with a proven record of selecting education projects that offer the best hope to narrow the achievement gap and raise student performance in math and science. Through its competitive, merit-based process, NSF is uniquely qualified to use its decades of experience in education research and evaluation to appraise grant proposals and to strengthen the link between research findings and classroom practice. The Partnerships program should be funded at the authorized level of \$200 million.

NSF also sponsors a number of other programs through its Division of Elementary, Secondary, and Informal Education that are designed to improve preK-12 science, technology, engineering and mathematics education. Some, such as the Instructional Materials Development Program, are designed to develop and disseminate instructional materials and assessments. Others, like the Informal Science Education Program, are designed to promote learning outside the classroom, including through the media, museum exhibits and community-based organizations. Total funding for Elementary, Secondary and Informal Education at NSF—a division of the Education and Human Resources Directorate—totaled approximately \$205 million in FY2005, excluding the Math and Science Partnership program. The President's budget request provides \$172.75 for FY2005.

PAEMST

The Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) was established by Congress and is run by the National Science Foundation (NSF). The program identifies outstanding science and mathematics teachers, kindergarten through 12th grade, in each state. These teachers are to serve as models for their colleagues and will be leaders in the improvement of science and mathematics education.

Since 1983 over 3,000 teachers have been selected to enter the network of Presidential Awardees. While most have remained in the classroom, some have become school principals, supervisors, superintendents and college faculty.

Recognition is given to K-12 teachers in four award groups: (1) elementary mathematics, (2) elementary science, (3) secondary mathematics, and (4) secondary science. The secondary groups include middle, junior, and senior high school teachers. The award now alternates yearly by grade level, beginning with teachers of grades 7-12 this year. Next year, the award will recognize teachers of grades K-6.

Teachers applying for the award must be nominated. Anyone may nominate a teacher (self-nominations, however, are not accepted), but a state selection committee chooses three finalists from each award group for recognition at the state level. A national selection committee, comprising prominent mathematicians, scientists and educators, reviews the state-level finalists and makes award recommendations to NSF and the President. Each award includes a \$10,000 award from the NSF for the recipient's school and a Presidential citation. In addition, awardees are invited to attend an award ceremony and other Washington recognition events, including meetings with leaders in government and education.

4. Questions for Witnesses

The panelists were asked to address the following questions in their testimony before the Committee:

- Based on the involvement you have had with federal math and science programs, what are the most important and effective components of these programs?
- What are the factors that limit the performance of students and teachers in math and science? What is the single, most important step that the federal government should take to improve math and science education?
- What elements of your pre-service or in-service training have been most helpful in meeting the daily demands of working with students, developing innovative classroom strategies and delivering content rich instruction to a diverse group of students?